

Demand Response Baseline and Pilot Program Conceptual Details

**Presented to the MPSC Demand Response Collaborative
October 11, 2007**

DTE Energy®



Demand Response Document Overview



- **Baseline Methodology**
- **Residential Baseline**
- **Commercial Baseline**
- **Demand Response Pilot Concepts**

Demand Response Baseline Methodology



Base Data

Statistically valid DTE Energy Load Research Sample Data was used to produce this analysis. DTE Load Research Samples produce a statistical accuracy/precision level of 90/10 or greater at the hour of monthly peak (both coincident and non-coincident).

Analysis Method

- Hourly interval data for June – September 2006 was analyzed.
- Analysis for each class of customer performed independently.
- The hourly class demand for days with a high temperature of 70° and 90° evaluated.
- The average of each hour for all 90° days determined (weather sensitive load).
- The average for each hour for all 70° days determined (baseline summer load)

Underlying Assumptions

To determine weather sensitivity and baseline load it was assumed that very little air conditioning or other weather sensitive appliances including fans, pool pumps, dehumidifiers, etc., contribute significantly to a 70° load shape. Conversely, it was assumed that these types of appliances reach, or near, load saturation on 90° days. The simple difference of the 70° and 90° load shapes represents weather sensitive load.

Residential Weather Sensitivity

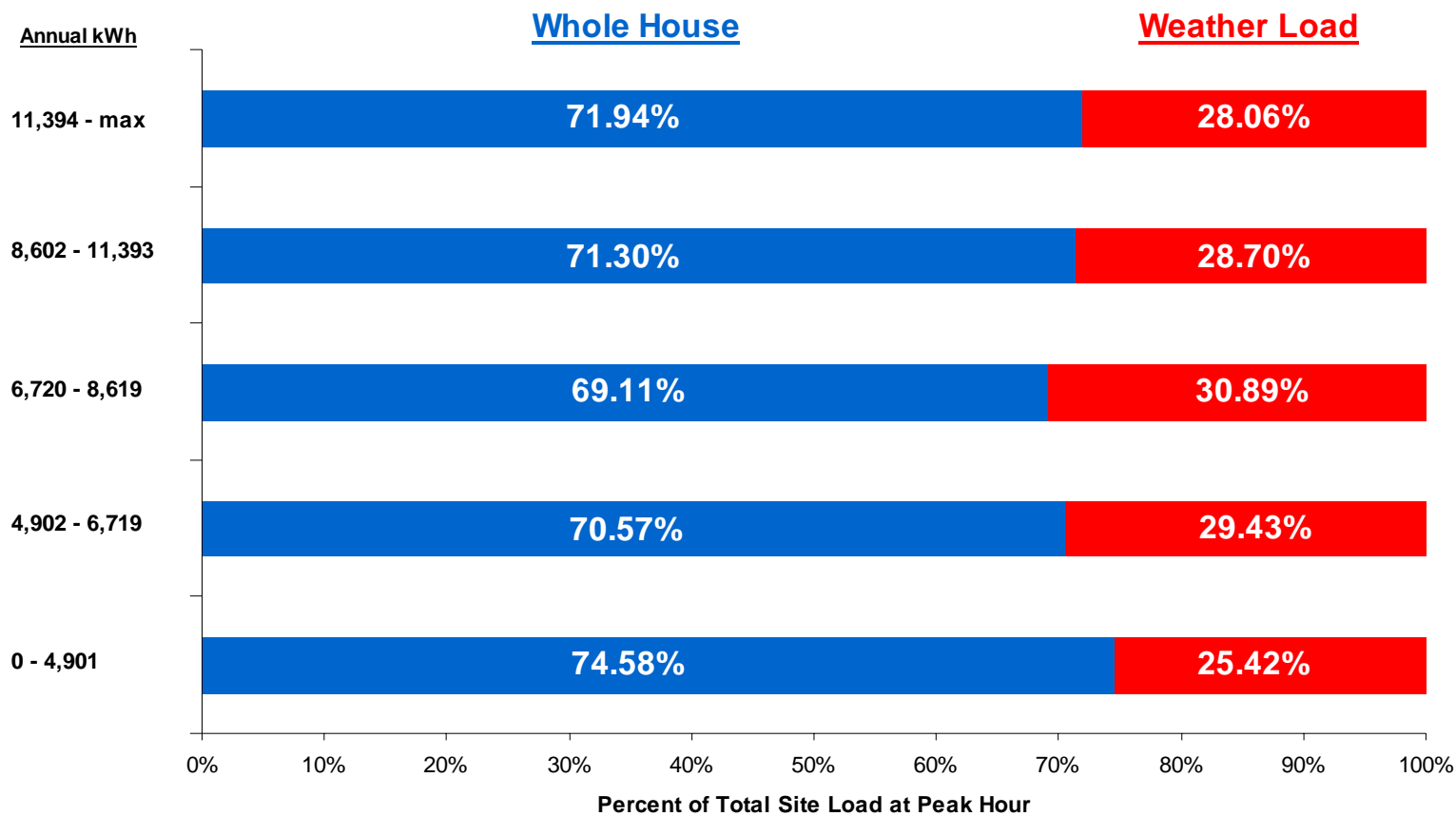
Whole House load vs. Weather load



2006 Summer Residential Demand Allocation

Whole House vs. Weather Sensitive Load

(Based on load analysis of 70° versus 90° days)

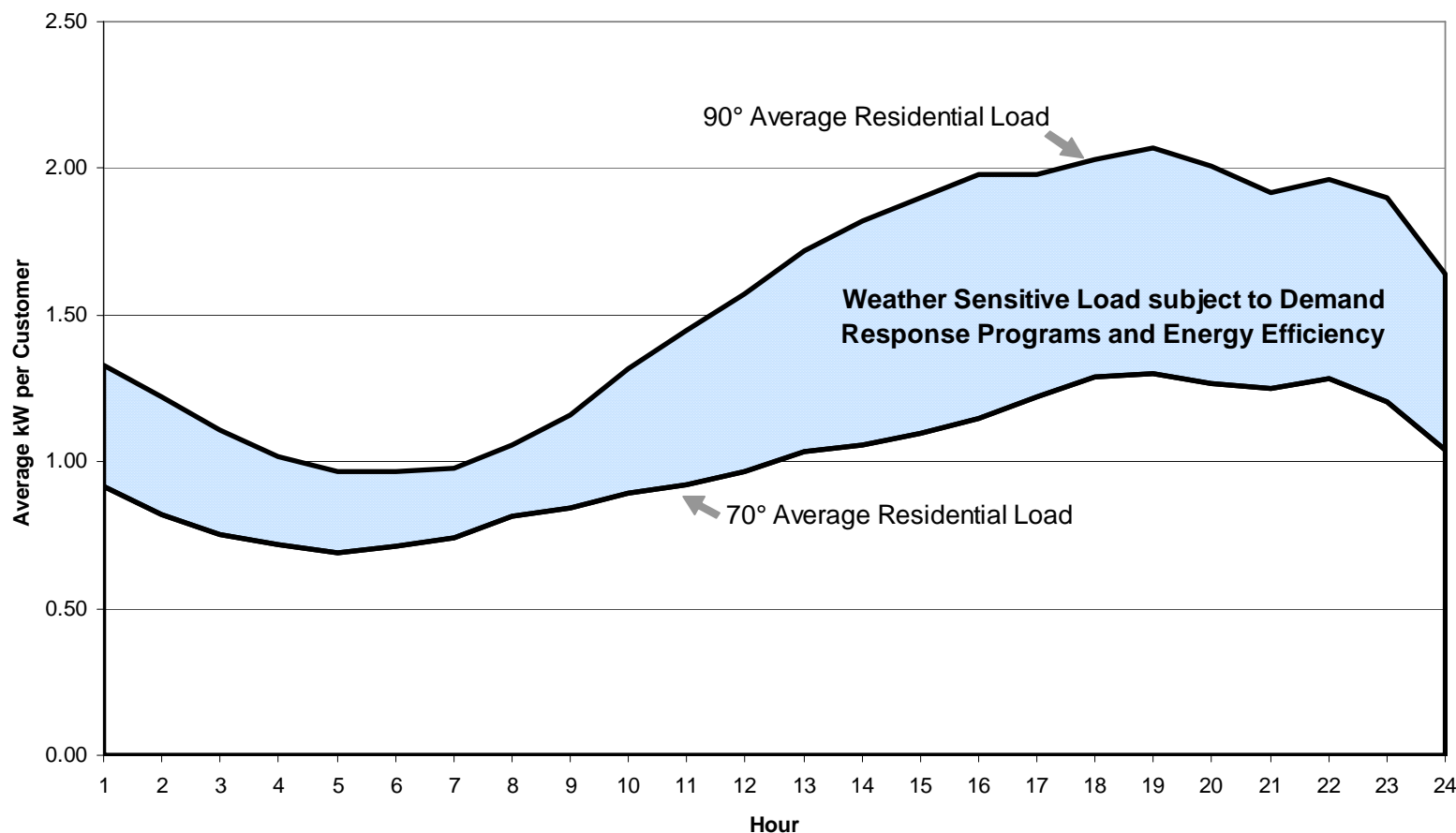


Demand Response Opportunity

Residential Baseline



Residential Baseline Load Shape
Based on Average Loads for 70° and 90° days for 2006

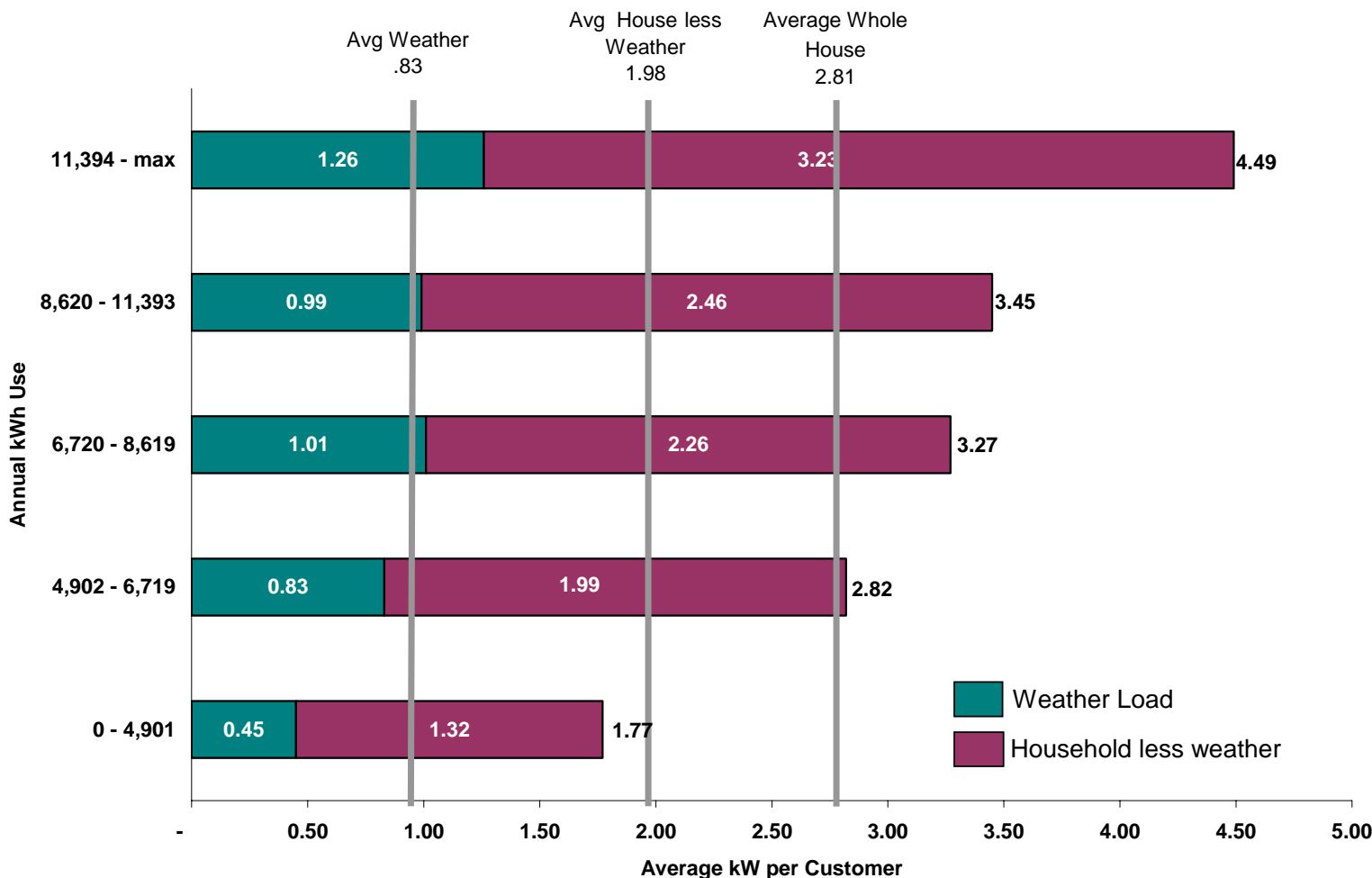


Demand Response Opportunity

Residential Baseline by Usage Strata



Residential Peak Demand (kW) by Strata for 90°



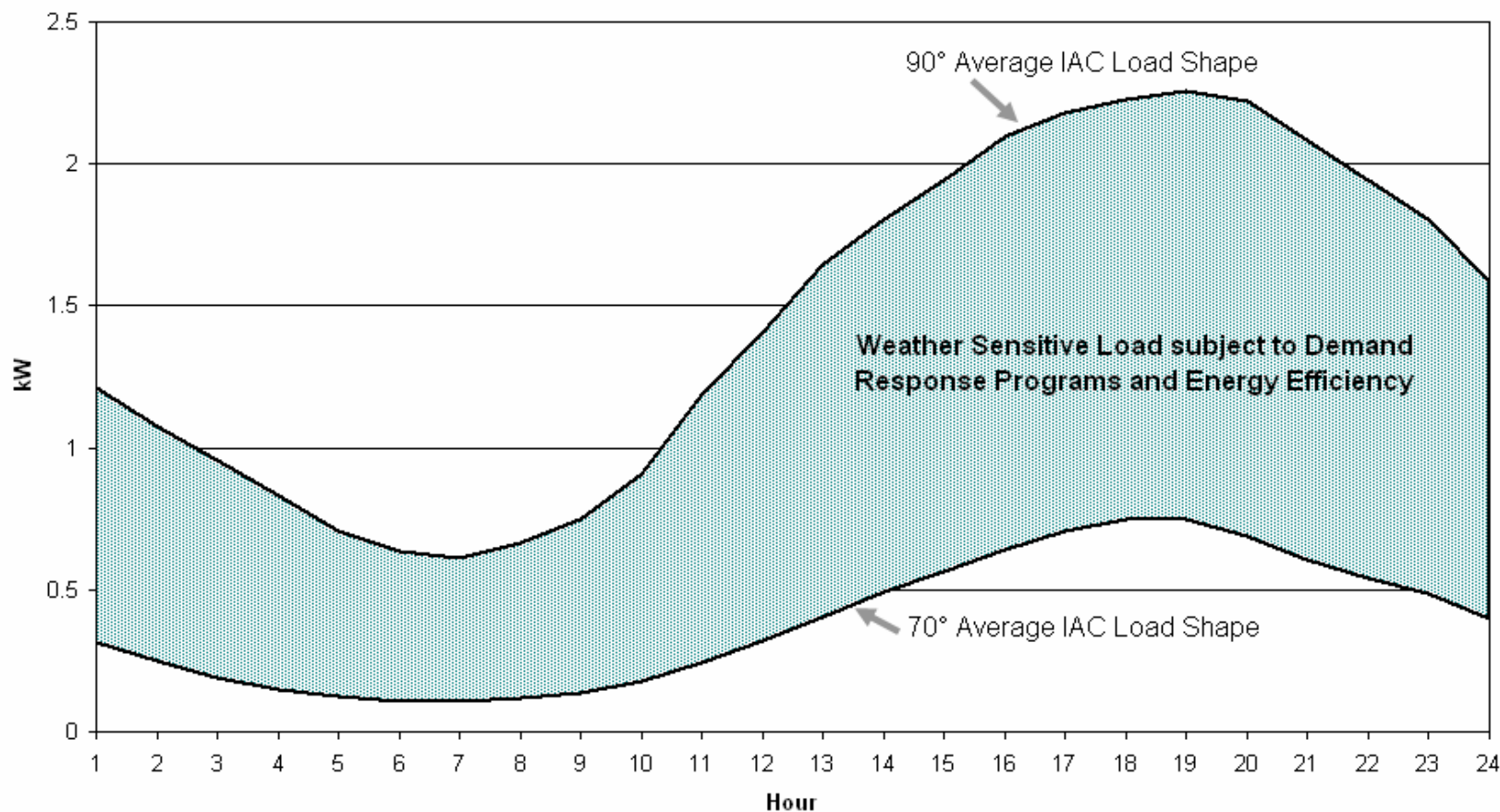
Demand Response Opportunity

Residential Air Conditioning Baseline

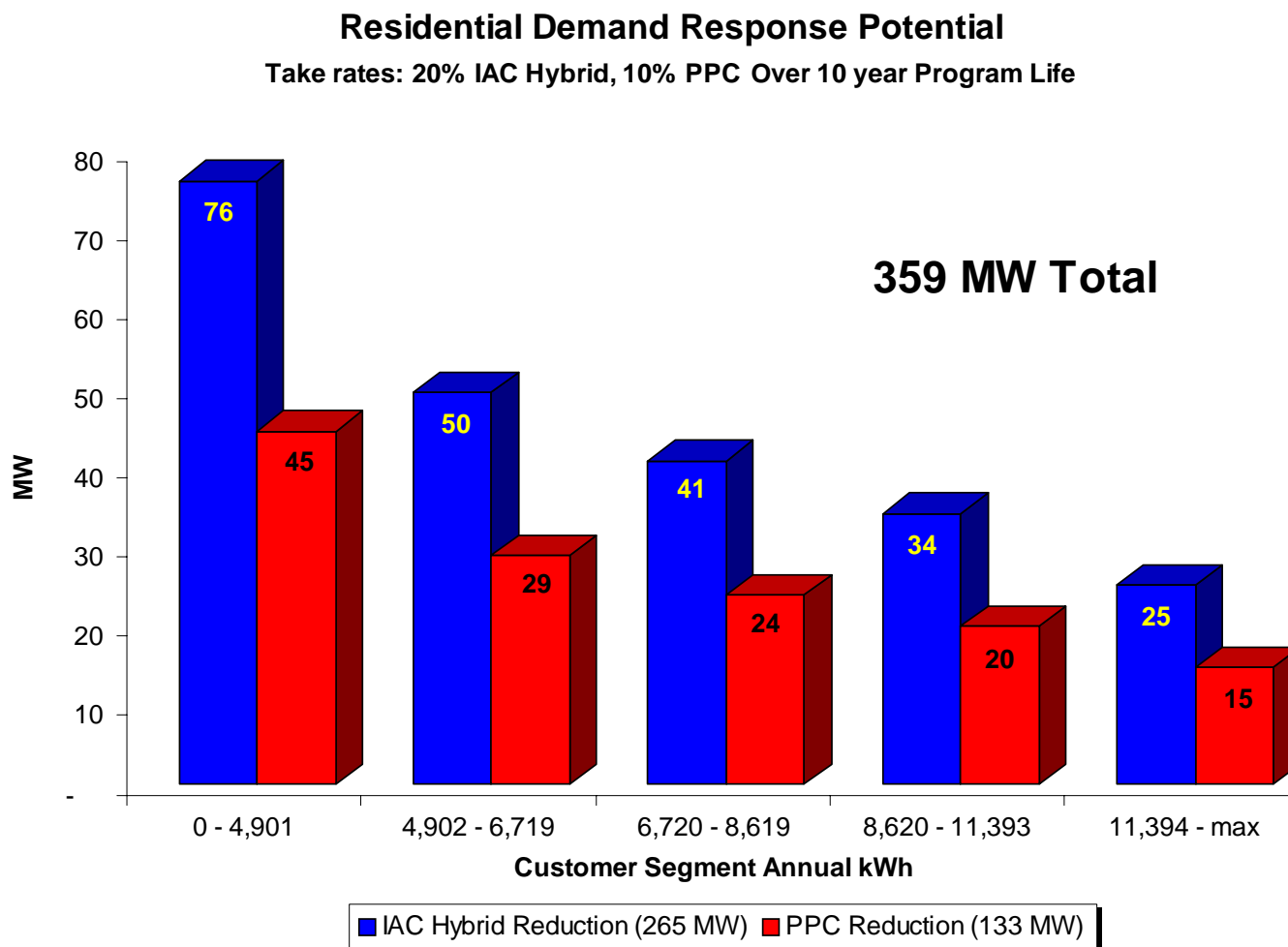


IAC Baseline Load Shape

Based on Average Loads for 70° and 90° days for 2006



Demand Response Residential Potential

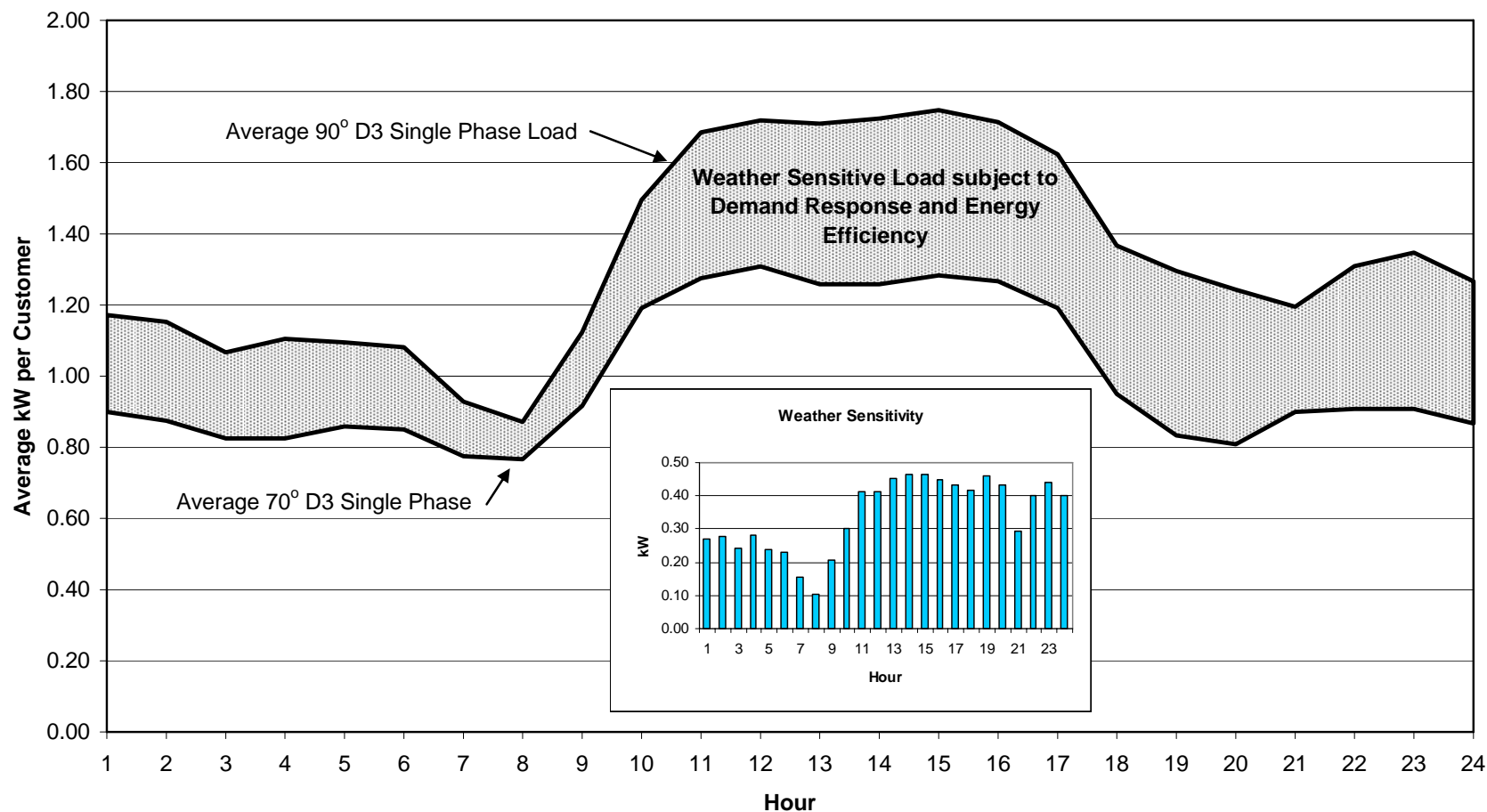


Commercial Baseline Single Phase (Small Commercial)



Small Commercial / Single Phase Baseline Load Shape

Based on Average Loads for 70° and 90° days for 2006

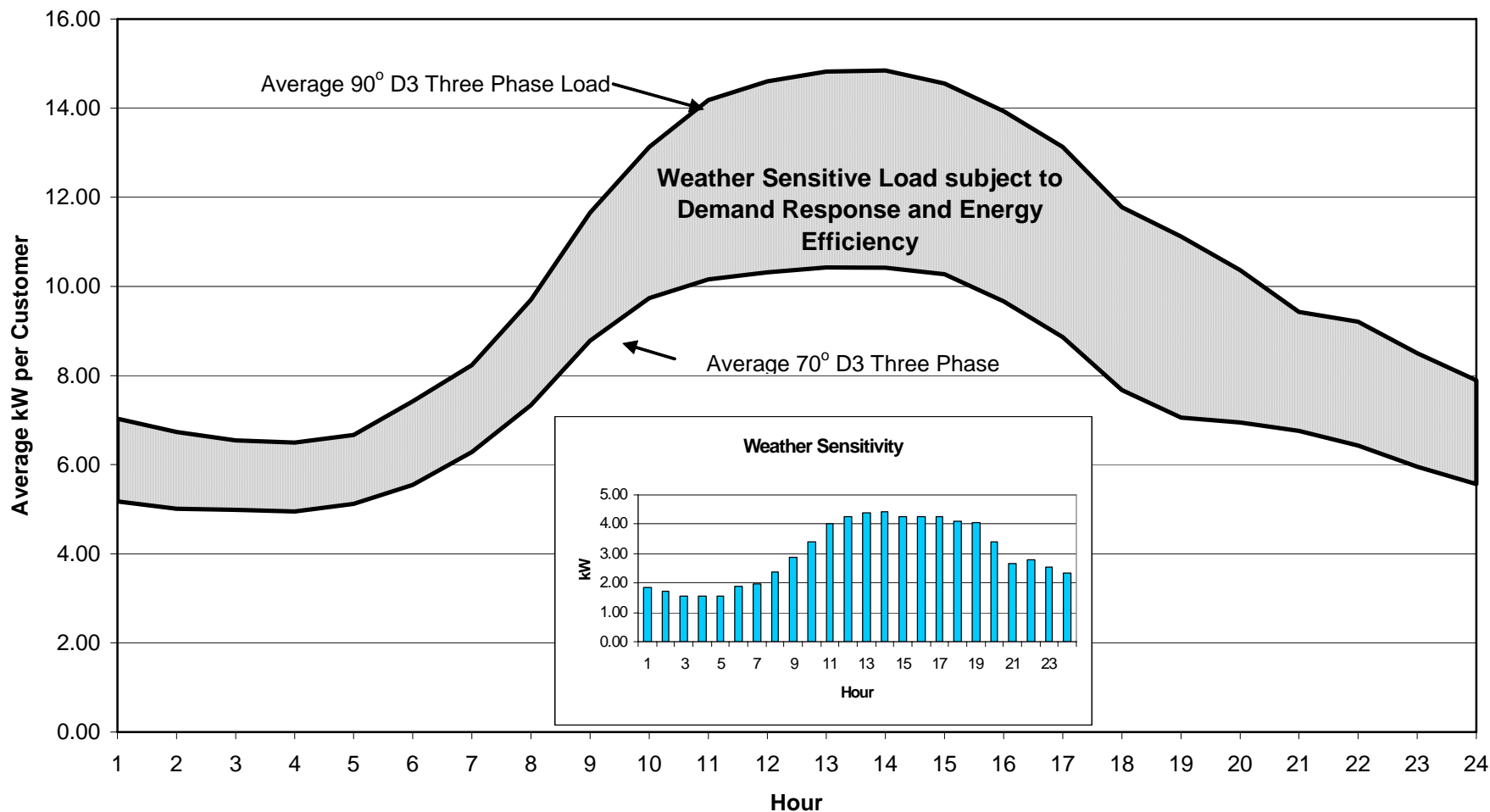


Commercial Baseline Three Phase (Medium Commercial)



Medium Commercial / Three Phase Baseline Load Shape

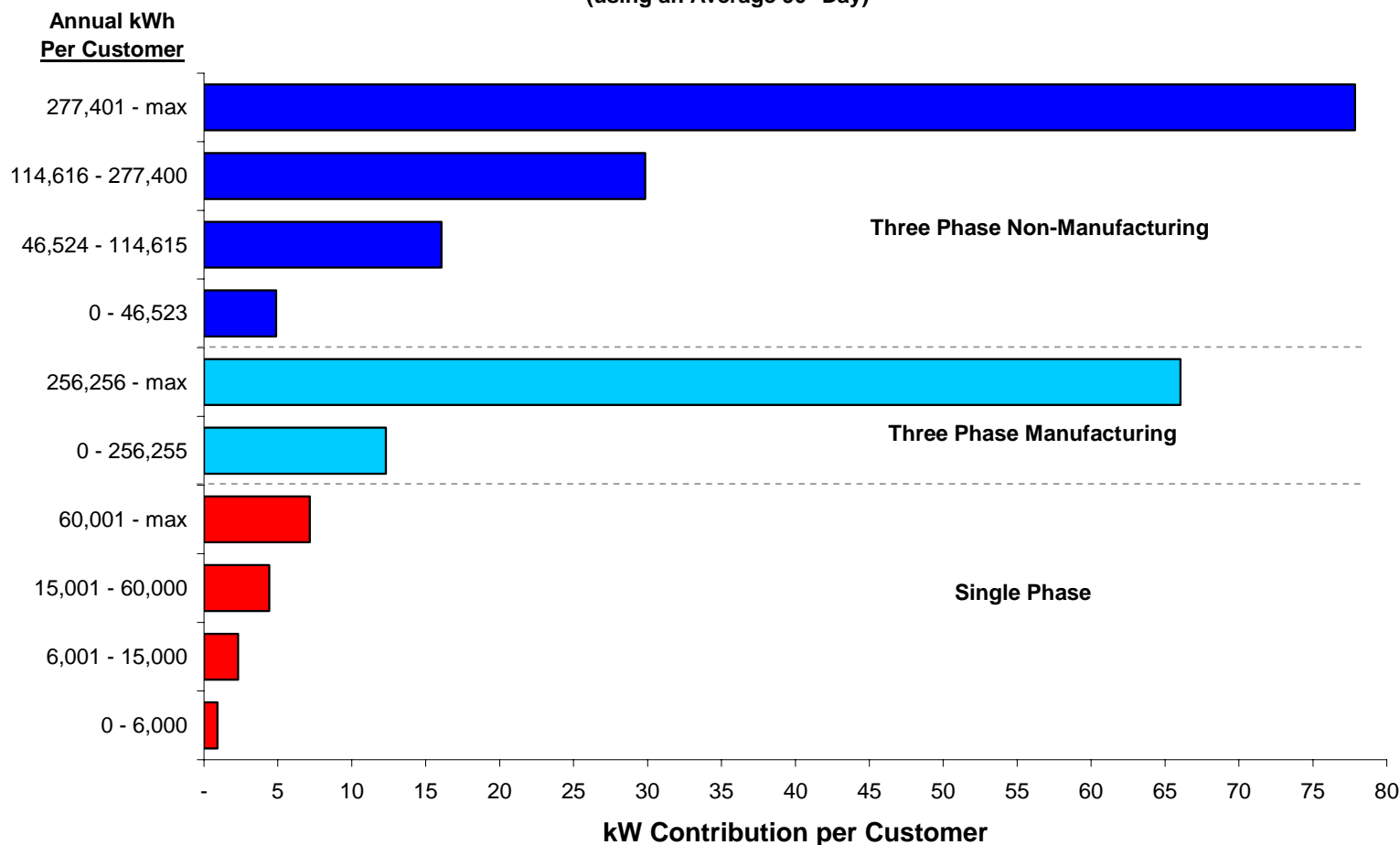
Based on Average Loads for 70° and 90° days for 2006



Demand Response Small & Medium Commercial Potential kW contribution per customer



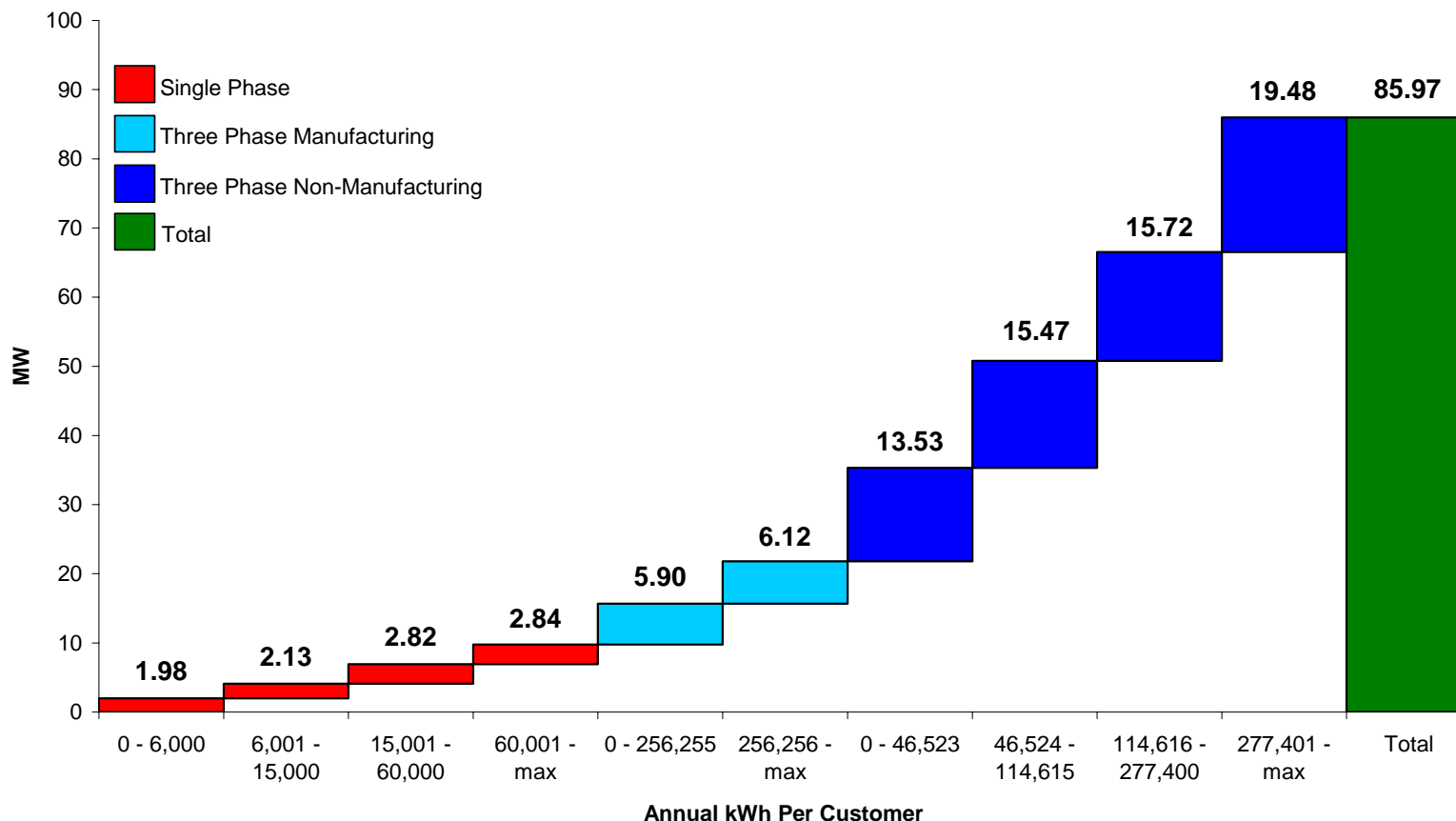
Potential CPP Load Reduction per Customer
Small - Medium Commercial Class
20% Customer Take Rate - 30% Load Shed
(using an Average 90° Day)



Demand Response Small & Medium Commercial Potential Total MW



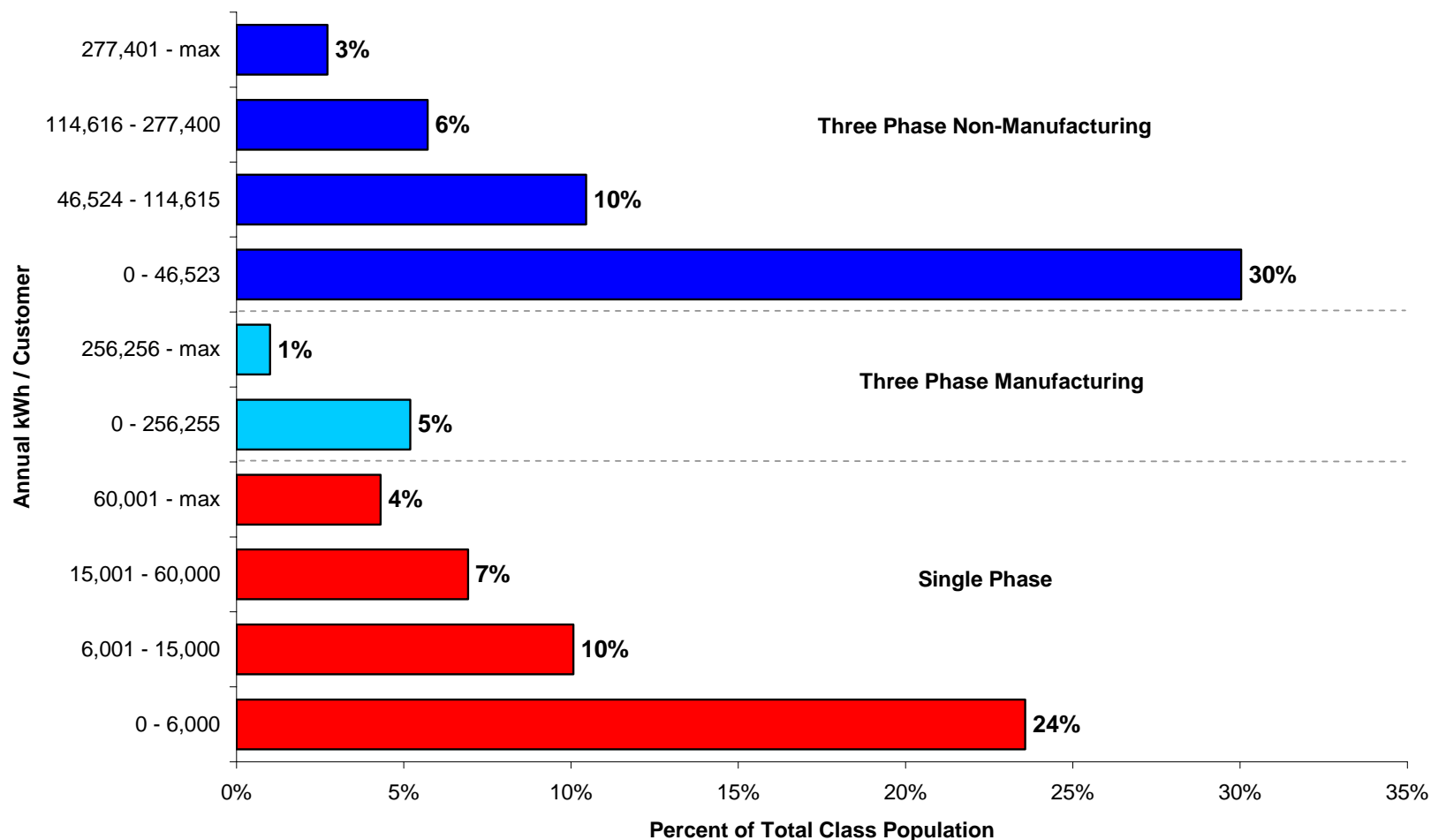
**Potential CPP Load Reduction
Small - Medium Commercial Class
20% Customer Take Rate - 30% Load Shed
(using an Average 90° Day)**



Demand Response Small & Medium Commercial Potential Customers per segment



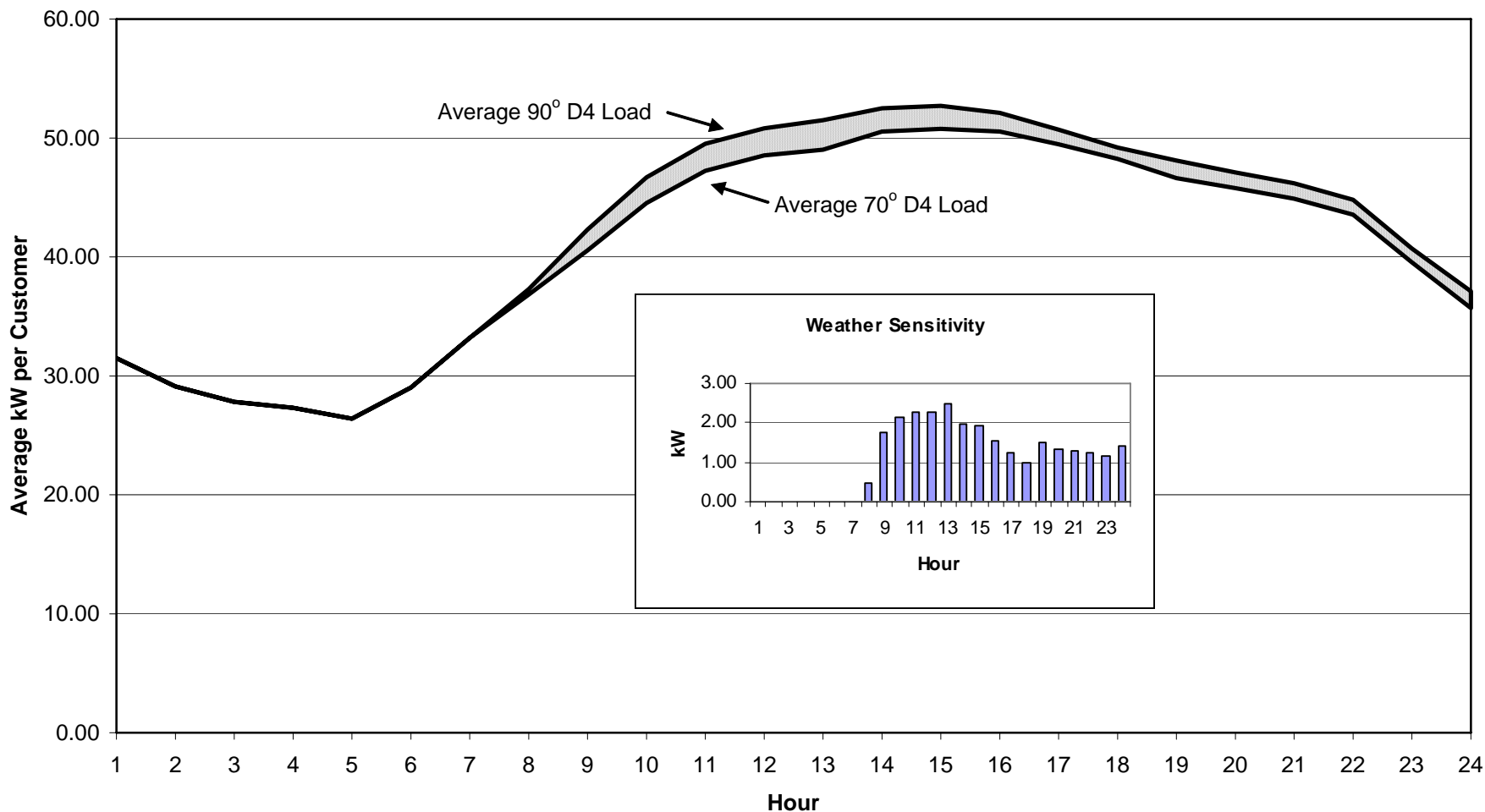
**Population per Segment
Small - Medium Commercial Class**



Commercial Baseline Demand Based (Large Commercial)



Large Commercial (Demand Based) Baseline Load Shape
Based on Average Loads for 70° and 90° days for 2006



Pilot Program Concepts

Core Assumptions



Pilot Program design and technology utilization must leverage AMI, Smart Metering, in-home communications, intelligent thermostats, and smart outlets.

Core Assumptions/Measures

- The installed/kW cost of any pilot must be below the installed cost/kW of a Peaker to be viable
- Installed pilot sites should have a minimum load shed capability of 1 kW
- A large percentage of pilot customer installations must be direct load control sites to:
 - Accurately estimate total population load shed
 - Determine operational advantage to the LSE including reserve capacity measurement
- Customer incentives are not guaranteed payment without measurable customer participation
- Customer incentives should be aligned with both customer and LSE risk (i.e. a 2° increase in a customer thermostat without physical interruption is less risk than the actual interruption of a central air conditioning unit and therefore the customer incentive should be less).
- Tariff structures should provide penalty for non-compliance
- Product offerings should promote customer behavioral shifts in electrical use and energy awareness

Pilot Program Concepts

Interruptible A/C Hybrid



IAC Hybrid (Residential/Commercial)

This pilot is a hybrid of Detroit Edison's successful IAC program. The key difference is the IAC Hybrid program utilizes a smart thermostat capable of control by the LSE via the AMI network. The concept is that a LSE controlled thermostat can provide the same level of load control as the interruptible control unit used on the existing IAC without actually interrupting the customer. The current IAC program cycled interruption equates to ~2° increase in the household temperature. By controlling the thermostat and increasing the customer setting by 2° (or 2° increments if necessary) the net effect will approximate the IAC cycled interruption without the need for separate metering and control units at the customer premise.

Key Rate Design/Operational Considerations

- The current IAC provides ~\$35 of annual savings/incentive to customers via the 2¢ rate differential to D1. The new rate incentive should be proportionally equal to avoid crossover and minimize lost revenue and subsidies.
- What will be the rate impact on customers who bypass the thermostat control?
- With customers CAC served by the same meter as the whole house how should the rate incentive be handled?
- Should the incentive be on a seasonal basis versus a per kWh basis? (i.e. a \$/month credit for enrolled customers for months June-October, or a \$/control period)
- Part of the customer incentive may be a free thermostat with installation and education package.

Pilot Program Concepts

Residential Peak Period Control (PPC)



Peak Period Control (Residential)

Customers would enroll on an incentive based rate that permits thermostat control for a predetermined number of days and a set period of hours (i.e. 11 am – 7 pm). PPC days would be based on either a market price threshold or a reserve requirement threshold that is yet to be determined. Customers would be notified of the PPC day one day in advance. Similar to the Thermo IAC pilot, customers would agree to thermostat control by the company on PPC days.

Key Rate Design/Operational Considerations

- The total rate based incentive should be lower than the Thermo IAC based on the fact the customer assumes less risk.
- How should the incentive be handled, a) ¢/kWh, credit/season, reduced service charge, or credit/PPC day? Move to more pay for performance rate rather than free riders or maximum incentive for minimum risk rate.
- Part of the customer incentive may be a free thermostat with installation and education package.
- What is the rate penalty for thermostat bypass?
- How will PPC compete with Thermo IAC?
- Will PPC load shed actually provide same value as IAC?
- PPC could apply to both Residential and Commercial classes. Should incentive be different?

Pilot Program Concepts

Residential Critical Peak Pricing (CPP)



Critical Peak Pricing (Residential)

Customers would enroll on an incentive based rate that promotes customer response to actual peak pricing signals. Critical Peak Pricing (CPP) signals will be communicated to customers one day in advance and provide customers with the price/kWh and hours the price will be active. Customers will be empowered to decide how much they will be willing to pay for service during these hours OR what actions they will take to reduce consumption.

Key Rate Design/Operational Considerations

- What are non-CPP price period charges?
- Part of the customer incentive may be a free thermostat with installation and education package.
- Over and above providing customers with a free thermostat is additional incentive required?
- How will CPP compete with Thermo IAC?
- What real impact will CPP actually provide?
- CPP can apply to both Residential and Commercial classes. Incentive mechanisms will likely differ?

Pilot Program Concepts

Commercial Critical Peak Pricing (CPP)



Critical Peak Pricing (Commercial)

During peak periods, based on pre-set market price, customers would be required to reduce their load by a predetermined amount. Customers would receive notification of a CCP day one day in advance. The control of the load reduction resides solely with the customer. This rate could possibly require customers to have a minimum kW load to qualify and have a set percentage or kW reduction requirement for enrollment. Notification of CPP can be by thermostat signal, email, pager, telephone, website, or any combination. CPP rate period likely to be set for months May-September.

Key Rate Design/Operational Considerations

- Offering could also be designed as a direct control rate similar to PPC with load control via thermostat control. However customer controlled load may actually exceed HVAC reductions. Generally felt that CPP offerings should permit customer control over specific load reduction decisions
- Should customer incentive be through kWh or kW pricing?
- Rate incentive given only for CPP hours with minimum customer incentive per year – possibly through a reduced Service Charge.
- What should non compliance charges be based on?